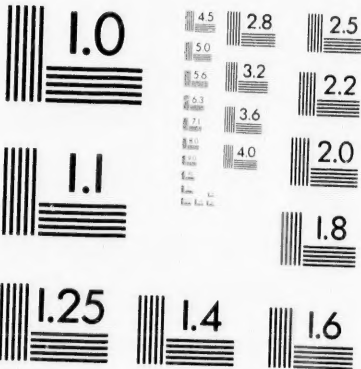


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R E P O R T

OF THE

TRUSTEES

OF THE

BRITISH AND CANADIAN

MINING COMPANY OF LAKE SUPERIOR.

MONTREAL, 2ND JANUARY, 1847.

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R E P O R T
OF THE
TRUSTEES OF THE BRITISH AND CANADIAN MINING
COMPANY OF LAKE SUPERIOR.

Montreal, 2d January, 1847.

TO THE STOCKHOLDERS OF THE

British and Canadian Mining Company of Lake Superior.

The Trustees have the honor to report, That in order to carry out the views of the Association, the services of E. H. Thomson, Esquire, as Superintendent, and of J. T. Hodge, Esquire, as Geologist and mineral explorer, were secured. Mr. Hodge is a gentleman well known in the scientific world, and was strongly recommended as a person of undoubted knowledge and talent, and in whom every confidence could be placed; Mr. Thomson's energy and capacity rendered him in every way qualified for the trust reposed in him. The expedition, at the head of which were these gentlemen, after visiting several parts of Lake Superior, selected as a location for this Company, the island named Prince Albert's Island and the land in rear of the same, with a front of two miles on the lake by five miles in depth, for a full description of which the Trustees refer to the several reports of Mr. Hodge and of Mr. Thomson, and to the map hereunto appended.

No progress has been made in mining beyond that of testing the veins, but sufficiently to induce the employment of a party of miners as early as the navigation will admit their reaching the island, in order more fully to test the veins, and if found of the expected value, forthwith to commence mining operations; but the trustees do not advise any expenditure in machinery, until such time as it will have been fully proved that the ores are there found in sufficient quantities to warrant its purchase.

Judging from the analogy existing between the veins found on Prince Albert's Island and those found in its immediate vicinity, on Spar Island, which are proving so valuable and rich, the company has every reason to be pleased with the location selected, as leading to the hope that similar indications will produce similar results.

The terms granted by the Government of Canada for the purchase of these mineral lands, must be considered highly favorable, being a title in fee simple at four shillings per acre without any reservation whatsoever, payable in five yearly instalments with interest, and will create confidence in the Stockholders being certain that whatever success may attend the enterprise, they will not be interfered with.

The instalment called in by the articles of association being in a great measure expended, it will be necessary to call in a further instalment of one dollar per share early in the ensuing spring, to meet the expenses of the summer's work.

The Stockholders may rely that the greatest prudence and economy will be exercised, and they must not be discouraged if they find the bright visions they had at first formed not fully realised. In a new country like the shores of Lake Superior, where every thing has to be discovered, great difficulties have to be surmounted and but little progress can be made, the more especially when the bowels of the earth have to be opened for the treasures sought. Patience and perseverance must be exercised by the miner, these with prudence and economy will overcome all obstacles, and the Trustees have no doubt, will realise the visions of the most sanguine minds.

There is no cause for discouragement, and if appearances are not deceptive, there is a fair field presented to the miner where his enterprise and exertions will be rewarded by complete success at no distant period.

Respectfully submitted.

GEORGE DESBARATS,

President,

B. & C. M. Co. L. S.

Report of E. H. THOMSON, Esquire.

Montreal, December 12th, 1846.

To

GEORGE DESBARATS,
JOHN M. TOBIN, and
THOMAS A. STAYNER, Esquires,

Trustees of the British and Canadian Mining Company.

GENTLEMEN,

IN compliance with an engagement made to you in my Letter, dated October 1st, 1846, I beg leave to communicate the following description of the veins and general features of the country, as embraced in the mineral location claimed under a certain Letter of License granted by His Excellency the Right Honorable CHARLES THEOPHILUS, Baron METCALFE, of Fernhill, then Governor General of the Province of Canada, bearing date the first day of October, one thousand eight hundred and forty-five, to GEORGE DESBARATS, Esquire.

"Prince Albert Island" is situated about half way between Fort William, a trading post of the Hon. Hudson Bay Company, and Pigeon River, on the north coast of Lake Superior. The island is nearly three miles long and one quarter of a mile in width. Upon a careful examination it was found that two miles in length would embrace all that was valuable, leaving the residue of territory under the Government orders of May 9th, 1846, to be chosen and selected from the main land; this was accordingly done, and the direction taken was that which would best conform to the course of the veins on the island.

In giving a description of the veins discovered upon Prince Albert Island, my views will be confined entirely to their surface appearance, and with a view of preventing any confusion as to what otherwise might be deemed a repetition and similarity, I have numbered the veins from west to east, commencing at the south side of the Island and at the north-west corner.

VEIN No. 1.

Vein number one makes its appearance upon the most western end of the island, with a magnetic course bearing east and west, it is found in a greenstone trap some eight inches wide, well filled with calcareous spar, and is seen to dip to the south 85 degrees.

VEIN No. 2.

Vein number two is found in a precipitous cliff of porphyritic trap, from six to eight inches wide, and disappears in the cliff with a bearing of north 25 degrees west, pitching westward at an angle of 60 degrees; the vein is composed of calcareous spar.

VEIN No. 3.

Vein number three has a width of six inches and a course north 50 west; it is composed principally of calcareous spar and the sulphate of barytes.

VEIN No. 4.

Vein number four is about two feet and a half wide, with a course north 25 degrees west, and like vein number three is composed of calcareous spar and sulphate of barytes. Veins marked on the map of the island and numbered five, six, seven, and eight, present the same appearance, and may be classed as vein number four.

VEIN No. 9.

Vein number nine is found in a greenstone trap and presents a width of three feet. It is seen in a cliff some twenty-five feet high and increases in thickness as it descends from the top of the cliff, exposing a width of six inches greater at the base than at the top—the surrounding rock presents a peculiar appearance from the great abundance of iron which enters largely into its composition, and is so highly impregnated with this mineral that upon exposure to the weather it has become oxidized, giving the rock for a distance of nearly a hundred feet upon each side of the vein a dull red colour. The vein preserves a uniform course for several hundred feet into the lake, and loses itself in deep water.

VEIN No. 10.

Vein number ten, or Cave vein, makes its appearance upon the west side of a small indentation in the coast, separated

by about four hundred feet from vein number nine—it sustains a remarkable uniform width at the surface of the water of fourteen feet of solid spar; it enters the island nearly at right angles with the coast upon a line parallel with vein number three, or north 50 degrees west.

The vein is principally composed of calc. spar and crystallized quartz, and after blasting a day or two was found to be metaliferous and yielding the grey and yellow sulphuret of copper. Upon examination, this vein was traced over a bluff one hundred feet high, when it disappeared beneath a mass of immense blocks of detached rock, but by continuing upon its line of bearing it again makes its appearance in the cliff, and preserves its width. At the base of the cliff the veinstone seems to have decayed and fallen away in such a manner as to have formed a cave, having at its mouth a width of fifteen feet, and extending into the hill twice that distance, with the floor of the cave dipping downward at a moderate angle. Within the cave a number of ramified veins make their appearance, and from two of the veins specimens of amethystine quartz were taken. It may not be improper to add that this ramifying or splitting of veins should not, according to Dr. Houghton, the late eminent Geologist of the State of Michigan, be taken as an unfavourable appearance, for metaliferous veins which have been extensively or profitably worked in other mineral districts have not been found to continue uninterruptedly any certain length, or well defined width.

This ramification appears to destroy the principal vein, but upon pursuing it, it was found again to unite, leaving the vein as fully developed and as well defined as at first. To the right and left of the principal vein and near the water's edge, two veins of less magnitude occur, and both observed to assume a course deflecting from a parallel with the principal vein, at such an angle, that if their continuity of directions were extended, they would be found to constitute feeders and intersect the principal vein at or near the cave.

I regard this occurrence of considerable importance, as experience has shown in all mining countries that wherever mineral veins are ascertained to intersect either at right or

acute angles, they have invariably been found to be most productive at or near their junction. The rock is made up of compact greenstone in the cliff, but immediately upon the coast the adjoining rock presents the same character peculiar to vein number nine.

VEIN No. 11.

Vein number eleven is a small irregular vein, and has the same appearance of being a feeder to the cave vein.

VEIN No. 12.

Vein number twelve is a small vein running an east and west course under water, and at the point of entering the bank was found to contain the yellow sulphuret of copper.

VEIN No. 13.

Vein number thirteen, like vein twelve, is a small vein from ten to twelve inches wide, found at the foot of a porphyritic dyke in a greenstone trap.

VEIN No. 14.

Vein number fourteen has a course north-west and south-east, dipping northerly at an angle of 80 degrees, it is composed of calcareous spar, sulphate of barytes and quartz with a width of seven feet between the wall rock; connected with it are a number of small ramifying veins irregularly crossing the principal vein, and having a width from ten to twelve inches.

The main vein makes its appearance in a perpendicular wall of greenstone trap, and reaches to the summit of the cliff, when by following it a short distance it loses itself, but again makes its appearance on the opposite side of the island and with a width equal to that first mentioned.

VEINS Nos. 15, 16, 17.

Veins numbered fifteen, sixteen and seventeen are small veins found in Pier Cove in a pyritiferous slate formation containing quartz.

VEIN No. 18.

Vein number eighteen is handsomely defined, and rises nearly vertically out of the water from seventy-five to a hundred feet high; the rock upon the west side of the vein assumes a porphyritic character, large crystals of feldspar occasionally appearing.

The vein is seen to cut the cliff diagonally with a bearing of north 55 degrees west, and boldly traversing the island outcropping upon the north, and exposing an isolated mass of the vein projecting several feet beyond the face of the cliff. The vein upon the south side of the island at the top of the cliff has a width of seven feet and increases at the water's edge to ten feet. The vein stone is composed of calcareous spar; several portions of the vein were distinctly marked with the green copper tinge communicated by the carbonate of copper. At this vein several days were spent in blasting, and which resulted in producing some very promising specimens of both the grey and yellow sulphuret of copper.

The wall rock for nearly thirty feet upon the west and seventy or eighty upon the east side of the vein, is filled with smaller veins, varying from six to ten inches in width and appearing to constitute feeders to the main vein.

VEIN No. 19.

Vein number nineteen consists of several smaller veins, making their appearance in the water and uniting into one vein at a distance of about one hundred and fifty feet from the water and containing a width of ten feet; the vein stone is principally made of calcareous spar and quartz, the former predominating, and found in a precipitous cliff of porphyritic trap over one hundred and thirty feet high.

VEINS Nos. 20, 21.

Veins numbers twenty and twenty-one present a small appearance on the south-east side of the island, and loose themselves in entering the cliff, but by preserving the course of the vein several depressions may be traced, and by following them leads on to the north side of the island to a vein twelve feet wide of calcareous spar. Several days were engaged here in mining, the lode of the vein was found to be highly impregnated with the yellow sulphurates of copper and iron; in some portions of the vein it was found to exist to that extent, that the least fracture would seldom fail to produce specimens of the ore.

VEIN No. 22.

Vein number twenty-two has a course nearly east and west, and with its feeders and branches is nearly thirty feet wide, the vein stone is principally of calc spar. This vein has been more extensively worked than any other vein upon the island, and I regret to say with no success; after sinking a shaft some twenty feet and finding nothing but the sulphuret of iron, it was finally abandoned. I am strongly of the opinion that the shaft should be continued some twenty feet deeper, with the hope that it will prove a cupiferous vein.

I regard "Prince Albert Island," as far as present discoveries have extended, to embrace within its limits a far greater number of those which may be justly regarded as true veins than any other location within this particular district. Taking experience as a guide, it may be regarded safe to infer, that similar veins in the same mineral districts, and occurring under the same geological relations, will in most cases lead to the same results, and no greater analogy can possibly exist than does in fact occur between the veins I have been describing and those successfully developed upon "Spar Island." A vein has been opened during the past summer upon this Island, under the agency of Col. J. H. Kinzie, for John Prince, Esq. M. P.; this island is but three miles west of Prince Albert, and upon working has been ascertained to be exceedingly rich in both silver and copper ores. Upon comparing the surface specimens from Spar island, with one or two of the veins opened upon this location, so close is the similarity that an experienced eye, familiar with the different minerals, would fail to detect the early specimens from each of these islands promiscuously arranged.

Prince Albert Island when seen from the waters presents as barren and as unforbidden appearance as may well be conceived—it is made up mostly of conical rocky knobs and mural cliffs of greenstone rising to a height varying from fifty to three hundred and fifty feet; the soil is barely sufficient to conceal the underlaying rocks, and the narrow interval of land between the different uplifts sustains an in-

ferior growth of birch, aspen and spruce, sufficient however to afford all the fuel that will be required for domestic purposes. It has two good harbours, and one at the west end of the island affording a sufficient quantity of water to admit of the entrance of any vessel navigating the lake, and easy of access.

Leaving the island and crossing over to the main shore, a belt of low land, some three quarters of a mile in length, makes its appearance, in the rear of which is situated "Sturgeon Bay." Crossing the bay, the country assumes a very interesting appearance; it is made up of high knobs and mural cliffs of columnar greenstone trap, attaining an altitude from six to seven hundred feet. The principal cliff, the base of which is washed by the waters of Sturgeon Bay, has its otherwise uniform course broken upon, by being made the outlet of a small lake lying in the interior from a quarter to a half mile. This lake has a width of a quarter of a mile and is nearly a mile long; it is elevated at least two hundred and fifty feet above the waters of Lake Superior, and is situated three quarters of a mile north-west from the head of Sturgeon Bay—the stream is sufficient to carry any ordinary machinery, and will doubtless hereafter be found of great practical importance. Leaving this lake and continuing in the same direction a half mile, lies still another lake, elevated some fifty feet higher; a communication exists between the two, and over a great portion of the way the water may be seen leaping and foaming over beds of immense erratic boulders of granite and other rock which has fallen from the adjoining cliffs.

The prevailing rock is Greenstone, and which is peculiar for its exceedingly compact base, and for the sharp ringing sounds it gives out under a blow from the hammer; it is traversed vertically by large fissures and cut into immense tabular masses by horizontal seams. The short time that was allotted to an examination of the main shore led to the discovery of several well appearing veins.

The most remarkable one will be found near the western termination of the cliff and which has its nearest approach to the lake. It was first discovered near the base of the

cliff in a veinstone of highly crystalized quartz, and was subsequently traced to the summit of the cliff which has an elevation of seven hundred feet. In blasting it was found to contain particles of galena and the yellow and grey sulphuret of copper; by following the vein a short distance it was seen to traverse the slate and trap with a bearing of north 60 degrees west, and present a width upon the very top of the cliff of nearly eight feet. Several other veins were found in various parts of the cliff to the east of Sturgeon Bay, and in the interior several promising veins were also discovered, varying from one foot to three in width.

As I have before observed, but a limited time was appropriated for the exploration of the main shore, sufficient however was given to determine the principal object of our search, viz. *the existence of copper*. The examination was more difficult than upon the Island, and the position of the veins less easily determined—the principal guide being the depressions in the surface which is often identified with the existence of the vein—or in climbing the rugged cliff and ledges of rocks which was not unattended with extreme hazard and difficulty.

It may not be inappropriate to remark in drawing this report to a conclusion, that I have examined during the past season the greater part of the north coast of Lake Superior, and visited personally many of the locations made by the various mining companies, and in no single instance have I seen a location which under all circumstances held out so many inducements for mining, and to prosecute with vigor at an early day the opening of the veins particularly distinguished and numbered on the map as 10, 14, 18, 21 and 22.

That they are highly metaliferous I entertain no doubt, and that they will be found to compare with any of the veins opened in the Country by judicious and economical management I equally believe. In this report I have studiously desired to make no pretensions to observations of a scientific nature—mine is a simple detail of impressions made upon my own mind from experience and from the ever varied scenes and circumstances with which I was daily surrounded—I have endeavoured to relate in a plain

and unvarnished statement no fact in connexion with the location secured by the letter of license and granted to Mr. Desbarats, but which upon *further examination* will be authenticated and supported by sufficient testimony; believing it to be the only prudent and useful method by which at no distant day the aid of British and other capitalists may be safely directed with confident hopes of its proving both a safe and profitable investment.

I should be doing injustice to my own feelings if I closed this report without adverting to the valuable services of Mr. T. W. Bristol who acted as my assistant during the past season, and from whose perseverance and industry as an explorer and minute observations I have derived much assistance.

My grateful acknowledgments are also due to the respective agents of the Hon. Hudson Bay and American Fur Company, and also to Col. J. H. Kinzie for the many acts of hospitality and kindness which have been extended to me by these gentlemen.

I have the honor to be,

Gentlemen,

Your Obedient Servant,

E. H. THOMSON.

Report of JAMES T. HODGE, Esquire.

To

GEORGE DESBARATS, Esquire,

JOHN M. TOBIN, Esquire, and

THOMAS A. STAYNER, Esquire,

Trustees of the British and Canadian Mining Company.

GENTLEMEN,

In my letter of August 14th, I believe I covered nearly the whole ground that I can expect to occupy in this report. Excepting more minute details and further accounts of the specimens I have subsequently examined, there will be little to add to that letter.

The tract selected by your Agent Mr. Thomson, on the north shore of Lake Superior, lies about twenty miles south from Fort William. It extends in its longest direction nearly north-west and south-east, at right angles with the line of the coast, and includes at its south-eastern extremity an Island somewhat longer than the two miles allowed for the width of the tract, and nearly one quarter of a mile broad. The other four miles and three quarters of depth is made up by running the lines into the interior back from the coast. The Government Agent allows this mode of measurement, reckoning as nothing the portion of the lake separating the parts of the tract.

In this wild and rugged country there is as yet little inducement to explore and take possession of those tracts lying back from the coast; the shores offer the greatest facilities both for the discovery of mineral veins, and their subsequent developement. The back country is not only extremely difficult to penetrate by reason of its great roughness, but its mineral character lies hidden much more than that of the rocky shores beneath the deep moss and other vegetable covering. On the six miles or so of coast on both sides of the Island the veins for the most part washed bare by the action of the water, stand prominently out when of harder material than the including rocks; or when the contrary is the case, their position is revealed by the depressions receding between the parallel walls of rock. From the number designated on the map accompanying this report, it is seen that few of them can escape notice. Their white color too, contrasting so strongly with the dark hue of the trap rock at their sides, betrays their existence in the bed of the lake; and their course is followed out and some of their characters ascertained in floating over them upon the still water.

All these groups of Islands and the whole coast against them are characterized by their bold outline, their precipitous walls and deep indentations; every Island furnishes harbors, and the main shore the greatest choice of them in its well sheltered bays. This uniform exterior is indicative of the same internal structure, and trap rock in its several

varieties is the prevailing formation. It rises in high cliffs of columnar structure forming stupendous palisades, as at Pie Island and on the main land opposite ; or it skirts the shore in dangerous reefs of compact green stone-trap, traversed by veins of calcareous spar and sulphate of barytes ; or runs in long straight dykes of reddish porphyritic trap extending from Island to Island, and sometimes standing above the water like an artificial wall. Narrow piles of a metamorphic slate in thin strata, nearly horizontal, are frequently seen lying high up against the steep cliffs of trap, as if they were the remnant of a once extensive but now nearly obliterated rock-formation. It is interesting to meet this slate formation so common along the shore, and to see how it has been altered and destroyed by the trap ; but whether or no it has any relation upon the productiveness of the metallic veins, is a matter that cannot yet be determined. The trap rock is their true repository, and the porphyritic character of a portion of it is believed to be highly favorable for their development. Among the granite rocks of Cornwall the porphyry dykes partake more of a granitic character ; in the traps of Lake Superior their distinctive peculiarity is more trappean ; whatever practical importance may be attached to the fact of the analogies in the Geological structure of the two countries, the Cornish miner will here recognize with great interest the counterpart of the granite in the trap, that of the "elvan" in the porphyry, and of the "killas" in the slates.

The veins of calcareous spar and sulphate of Barytes referred to above, are those which contain the metallic ores. Such veins are the common repositories of copper ores in other parts of the world ; and from this fact they give an assurance of the permanence of the lodes which the more novel veins of quartz containing copper in a metallic state alone, do not so generally inspire. These veins from mere threads to large belts of *fifty* feet in thickness, traverse the trap and slate, one set of them running north north-west and south south-east, and another not so numerous nearly east and west. Besides these two minerals they also contain fragments of the wall rocks which have fallen from

above, while the veins were in process of filling, and bands too of trap rock also alternate with the other materials above named and also with quartz of milk-white and amethystine colors ; sometimes these are seen systematically arranged as in the accompanying figure, (see map) which represents the structure of one of the veins on the tract occupied by Mr. Gratiot for James Bell Forsyth, Esquire.

The central part of the vein is calcareous spar 20 inches thick : On each side of it are small seams of quartz one quarter of an inch thick : outside of these are layers of trap rock, each six inches thick : then calcareous spar again, each layer three inches thick. The only sulphate of barytes seen, is in the extreme upper corner to the right where a very thin seam of it comes in between the trap wall rock and the outer layer of calcareous spar. In some of the veins wrought near Freyburg in Saxony, this peculiar structure has particularly been noticed and described, and this example is given here to prove the resemblance in the general character of the veins of Lake Superior with that of other veins in the oldest mining districts.

The ores which are the yellow and grey sulphurets of copper, the sulphuret of Iron or *mundic*, the sulphuret of lead or *galena*, occur diffused in greater or less proportion through these vein stones or gangues. On the surface where they can have been exposed to the decomposing effects of the atmosphere, they have for the most part long ago disappeared, so that frequently not a trace is left of their existence. This may extend to a much greater depth than we would suppose any atmospheric agencies could penetrate through what appears solid rock. Yet it is not unusual to sink even thirty feet without arriving at any reliable conclusion as to the real metalliferous character of the lode : much deeper indeed, veins are subject to great irregularities of composition which always give them an uncertain character ; but in proving a vein in a metalliferous district, which at the surface bare a general resemblance to other veins, one would rarely be warranted in abandoning the work until he had reached a greater depth than that I have named. Sometimes after the removal of the sulphureous ores by de-

composition, there remains behind a green stain of carbonate of copper upon the surface of the vein. This was the case with the large spar vein belonging to the British North American Company. The abundance of it encouraged the hope of finding rich ores near the surface, and in this they have not been disappointed. As this vein is the best developed in the country, it is proper to know the details concerning it, that we may the better judge of those whose features are more obscure.

The position of this vein is about three miles south-west from Prince Albert's Island on the extremity of another Island much like it. The vein stones are calcareous spar and sulphate of barytes with some quartz. The color of the whole mass, which is about sixteen feet thick, is quite white, so that seen at a distance of a couple of miles out on the lake, the vein has the appearance of a sail by the shore, or a tent upon the land. The first time I passed it, I was myself, and those with me too, were in doubt which it was. It cuts across the narrow neck of land at the south-west end of the Island and continues its course north 30 degrees west to south 30 degrees east in the rock at the bed of the lake. In sinking upon the vein, grey sulphuret of copper was soon found, and the quantity rapidly increased with the depth. The ore is argentiferous, which may somewhat increase its value. Trap rock forms the wall of the vein, and portions of it are of porphyritic character. Mr. Logan, the geologist for the government has traced out a very interesting porphyry dike, which runs across the line of this vein near the point where it is wrought. It passes along the south-east shore of the Island directly towards the same coast of Prince Albert's Island, and may be continuous there.

At various other points in the same vicinity the yellow sulphurets of iron and copper are seen in veins in the trap rock. Too little work has been done upon them to ascertain their value. Some of them, as near the mouth of Pigeon river, run a different course from that of the vein on Spar Island, and from most of the veins on the south shore of the lake lying east north-east, west south-west, which certainly is not a favorable indication. They establish however

the fact of the general diffusion of copper ores throughout the trap rock of the country ; and the Spar Island vein encourages us to pursue small surface indications in the hope that they will lead to large bodies of ore below.

None of the islands in this vicinity are more remarkable for the number and promising appearance of the veins upon them than Prince Albert's Island. More than twenty have been enumerated, as may be seen on the map, and these do not include a large number of small veins not considered of sufficient dimensions to warrant exploration. But all those designated on the map are worthy of attention. In their general characters they are much alike. The vein stones are similar to those of the veins already spoken of, and their course for the most part varies little from north-west and south-east. Some however instead of crossing the island at nearly right angles to its line of length, run longitudinally with it ; agreeing in this with the east and west system of veins I have already alluded to. The rock of the Island is principally trap rock, the only exception being the metamorphic slate, which is occasionally seen along the shore ; much of the trap rock is highly porphyritic, the crystals of feldspar being larger than I have seen it any other place in the country. The trap frequently rises directly from the water in precipitous walls of a hundred feet in height, and sinks beneath the surface almost as abruptly. In the interior of the Island, the highest elevation of the rocks is about three hundred feet ; they here present an extremely rough surface covered with deep moss and a thin growth of small birches, poplars and evergreens. Good harbors, though small, are found, one at each end of the Island, and a third at the south-east side.

The numbering of the veins commences on the southwestern extremity, and is continued along the southern side. On the north side a less number of veins are seen, and those which do appear are reckoned as continuations of some of those on the south side. Several have been traced directly across over the surface of the Island.

The first nine veins are not among the most promising numbers four and nine however are larger than the rest,

measuring about two and a-half feet each; and if there were no others still more prominent, would certainly demand attention. Number seven too, though not large, is a vein that appears well, as it is seen exposed from the water's edge up the cliff in a deep cleft. From the structure of the vein, one is much encouraged to look for metalliferous matters in it; but until some mining is done, its true nature cannot be known; number four, runs about north 25 degrees west, and the others pursue a parallel course; they lie nearly or quite vertically. In the vicinity of numbers eight and nine the trap rock is highly colored by the red peroxide of iron; its whole surface is stained by the ferruginous rust derived from the decomposition of the sulphuret of iron, with which it must be charged. Near by is vein number ten; this is one of the five most encouraging veins. The others are numbers fourteen, eighteen, twenty-one and twenty-two.

Number ten is remarkable for its great size, its promising contents and fine exposure, which renders it exceedingly convenient to open and mine. It shows itself at the base of a steep rocky cliff by the edge of the lake. It is traced out under the water on one side, and up the cliff over one hundred feet in height on the other, and thence across the island through which it cuts and again appears on the north side of it much reduced in size. It is composed of calcareous spar principally, but mixed with sulphate of barytes and amethystine quartz; the whole thickness on the land of the main vein is about fourteen feet; but under the water where it presents an extraordinary number of ramifications, branching out in the most complicated network, it occupies a thickness of full twenty feet. At the base of the steepest part of the cliff, there is an old cave in the vein, which being extended by mining, has brought to light specimens of vein stone containing grey sulphuret of copper, though no ore could be found previously to blasting. The specks of the grey copper are extremely minute and it is difficult to procure even enough for examination. I can only say that I was satisfied of the existence of the ore in the vein, and from its resemblance to the ore on Spar Island and from the

similarity in the general characters of the two veins, I consider this well worthy of farther examinations. Should the result be favorable, the position affords great facility in mining, for the working being run in horizontally from the base of the hill, the water instead of accumulating, as it does in deep shafts, flows out to the surface with no expense of drainage. This in most mines is a very serious item of cost; but in all the veins along the shore, where the land rises high in the interior, adits laid out from the shore will drain all that portion lying above their level. The course of this vein is about north 50 degrees west and its exposure on the north side of the Island shows a thickness of about two feet.

Number eleven is a small vein belonging to another set of veins; it crosses number ten, and at the point where they cross each other the greatest developement of ore is more likely to be found; though a vein of no consequence in itself it assumes some importance when considered in this relation. The same may be said of number twelve, which is an east and west vein, and is traced under the water as it runs parallel with the shore. At one point where the land projects out so as to cross its track, the vein is exposed to view and to examination—it is from six to ten inches thick at the surface and contains the yellow sulphuret of copper. Both this and eleven necessarily crossing number ten, and two of these veins being found metalliferous, the promise of ten proving to be an important vein is greatly increased; and then the proximity of the porphyritic trap, which is finely exposed within a few rods of these veins, is also a favorable indication.

Number thirteen is a small vein in the midst of the porphyritic trap on one side and the green stone trap on the other.

Number fourteen crosses the island—on the north-west side it is divided into two small veins which lie close together. This is the only place in which I have seen it, but it is described to me by Messrs. Thomson and Bristol as being much larger where it is seen on the south-east side, swelling out to some seven feet in thickness, and this not including the feeders or branches at its sides.

Number fifteen includes several small veins which lie close together in the pyritiferous slates on the shore of the harbour called Pier Cove—they cut through the outer point of this harbour and are veins of rather striking appearance. Their course is about north-north-west and south-south-east, and the vein stone in the slate is quartz. The slates near the veins are highly pyritiferous.

Numbers sixteen and seventeen are small veins of calcareous spar and sulphate of barytes on the north-east side of Pier Cove. They are seen in the high vertical wall of trap rock, which forms this shore.

Number eighteen is a larger vein in the same position, and containing the same vein stones, also amethystine quartz. It is about ten feet thick at the base of the steep cliff, and is seen well exposed up and down the precipitous wall, which is about one hundred feet high. Some examinations have been made on the top of the cliff, and also at its base by the edge of the water. Little satisfaction can be expected in opening into the veins on the highest summits; nothing more can there be ascertained than the general structure and direction of the veins. It is only at their lowest points of exposure that any developement of ores can be looked for, and no great show of these will often be found at these places until the miner has penetrated beyond the reach of all atmospheric agencies. Over the surface the vein was traced by exposures here and there across the island, and the work laid out upon it exposed its mineral structure. Fine specimens of amethyst, of the calcareous spar and heavy spar, were found, but no ores. But, at the bottom of the cliff, a single blast threw out masses of the vein stone containing regular seams of grey sulphuret of copper; the yellow sulphuret of copper also and sulphurets of lead and iron were found in them. These appearances at the surface are very encouraging and warrant the undertaking of mining operations as soon as possible. The position of the vein, though no footing can be had at present, may readily be made very convenient and advantageous, and the harbour of Pier Cove close by will afford protection for vessels and boats.

On the north-west side of the island this vein projects out into the water beyond the wall of trap rock. It stands in an ellipsoidal mass on its edge nearly vertically, rising to the height of about twenty feet, its slight inclination is south-west, that is its top leans to the north-east. Its thickness and course vary at different points, the standing mass in the water pointing west south-west and east north-east, and being about eight feet through; and the vein on the hill running about north 55 degrees west.

Numbers twenty and twenty-one on the south-east side are small veins, but what appears to be their continuation on north-west side is a large vein twelve feet thick. The composition of this is like that of the other veins, except that the sulphate of barytes and amethystine quartz in it are more highly crystalized. It affords the yellow sulphurets of copper and iron in considerable quantity, so that the promise is very good of its proving to be an important vein. I have seen no grey sulphuret of copper; still this more valuable ore may possibly be found after further examination; if so, I should consider this the most important point I have seen on the tract. The exposure of the vein is in the face of the steep cliff, and the workings may be run in horizontally from a point a little above the lake. It will be rather an inconvenient spot for carrying on mining, because there is no place near by for discharging the ores unless they are hoisted to the top of the cliff. To fill out a sufficiently high platform to be out of the reach of the waves, and large enough to give the necessary room, would be a work of no small expense. The vein however, should first be proved, as it may easily be, near the lake, and then such arrangements made as the result will warrant.

Number twenty-two is at the extreme north-west corner of the island; it is a large vein occupying with its branches or feeders a thickness of full thirty feet. More work has been done upon it than upon all the veins together. A shaft has been sunk about twenty feet on the vein, and fully exposed its metalliferous character. The prevailing ore is sulphuret of iron, it is seen in very small quantities, near the surface, and gradually increases towards the bottom of the

shaft. The veinstone is calcareous spar chiefly, with some sulphate of barytes and a bluish colored quartz, in which the ore is principally found. On submitting the sulphuret of iron to a thorough roasting and chemical examination, I find that the yellow sulphuret of copper is associated with it, and in such quantity that the prospect is very good, that at a greater depth it may become a valuable lode of this ore, the most common commercial ore of copper. From the direction of the vein which is nearly east and west, I do not think it likely that the grey sulphuret will be found; and therefore have not so high an opinion of the vein as I should if its direction were the same with that of the veins which are known to contain this ore. Still a good lode of the double sulphurets of iron and copper is a valuable acquisition, and the examination of the specimens has made me think much more favourably of it than when I left the country. An exact quantitative analysis I have not made, because from the very nature of the specimens taken from so near the surface, no satisfactory result would have been obtained of the character of the vein. It is enough to know that it is a cupriferous vein; and that the lode is growing richer the deeper it is opened. The top of the shaft is about twenty feet above the lake and a rod or two back from it. It is conveniently situated for working, but the facilities for drainage are not like those of the veins in the cliffs. The water here will be troublesome, and at any considerable depth will require horse power or a steam engine to raise it to the surface; but if the ore should improve as it has done from the surface down, this difficulty would be no very serious matter. A good harbor is close by, and a road can easily be made to the head of it.

These are the veins upon the island; several others are known to exist in the mountains on the mainland, but from their position and outward appearance they do not demand the same attention. The ridges here rise to a much greater height than upon the island; in many places they are absolutely inaccessible by reason of their steep precipices, and their structure at the base is concealed by the huge piles of loose rock and earth which have fallen from above. The

veins like those on the island, cut vertically through the rocks, and may be traced up and down their steep face. But on the very edge of the precipices is almost the only point where they can be examined. Such an examination is of a very unsatisfactory character, because it is only at their lowest points the veins in this country prove to be of value. Whatever ore therefore is found in such places may well be considered an indication of much more of the same existing below.

The only one of these veins which it is worth while to describe, is one I examined on the high cliff about a mile north from the outlet of Sturgeon Bay. The upper portion of the hill, which rises to the height of about seven hundred feet above the lake, is greenstone trap; the lower portion the altered argillaceous slate. I have before referred to, which is piled high up against the trap, and dips gently into the hill. The vein is exposed in the trap rock, and by very dangerous climbing is followed to the summit of the rocky cliff, about one hundred and fifty feet below the highest part of the mountain. It is a vein of quartz divided at the surface into several parallel strings which are comprized within a width of from two to six feet. Sometimes the two wall rocks appear to be twelve feet apart. The course of the vein is south 60 degrees east, north 60 degrees west, which if continued would cut the lower end of Prince Albert's Island. Scattered through the quartz in very small particles occur galena (the sulphuret of lead) and the yellow and grey sulphurets of copper. These are encouraging and would authorize further investigations, were it not for the unfavorable position of the vein, and the greater advantages offered by the veins on the island.

The fine harbor of Sturgeon Bay in this part of the tract may be considered of some importance should it be judged expedient at any time to commence mining operations here.

If it be fully proved, as I believe it is, that this Lake Superior region is a highly metalliferous country, there are nevertheless many matters beyond the mere contents of the veins, which have an important bearing upon their value, and should receive careful consideration from those propo-

sing to engage in the mining business. Both the facilities and difficulties attending the management of operations in the region are so prominent and simple in their nature, that they will require but few remarks, until the attainment of further details shall furnish data for exact estimates and calculations.

The remoteness of the country and its being in fact shut out by the effects of its climate, from the rest of the world six months at least of the year, are very serious objections. They involve the necessity of laying in full supplies for the winter every fall, of receiving no returns from the produce of the mines during this season; of always providing the most trustworthy agents at whatever cost; and in case of accident, to men or machinery, the impossibility of sending aid except when the lake is open. Thus, though it is a great thing to have so many fine harbors as there are on the north shore, it must also be remembered that these are closed by ice more than six months of the year; and again, if there are a considerable number of vessels upon the lake, they must in the short season of their work be paid likewise for the long period of inactivity of the winter. If each company as soon as their business will warrant, have their own vessels, much of the expenses of *transportation*, which is to be the great item of expense, will be lessened in no small degree. As the country from the barrenness of its soil can furnish no agricultural products of any account, all of these that are consumed, must come from below. So, for some time, of bricks, lime and eventually of timber and fuel; for the growth upon these lands is of the poorer sorts of trees, and these are generally of small size; while the consumption about mining establishments is always great for timbering shafts and galleries and constructing houses, and in so high a latitude, this must be largely increased by the quantities required for fuel. The principal growth is of small poplars, spruce, fir, cedar and hemlock; the only hard wood is birch, and this is of small size.

Another trouble resulting from the climate is the obstruction the snow and ice will occasion to much of the surface

work that must be continually going on about copper mines, such as the clearing and washing of ores.

But while the companies will suffer from some of these disadvantages, they will be at little expense for one item, which is usually one of the most considerable attending mining enterprises. This is the making of roads and keeping up of teams of horses and cattle for the transportation of their ores over land. Here, where the mines will be almost always on the borders of the lake, the ores may be delivered immediately into boats, and there will be no occasion of making expensive roads, and a very few horses will answer all the purposes of the mines. This very great advantage, and the facilities in the position of many of the veins for drainage already referred to, the abundance of excellent fish also taken in nets off the islands at very little expense, will go far to counterbalance many of the objections from the situation and climate of the country.

As to the disposition of the ores after they are got out, the only advisable course at present is to send them to the Atlantic coast for sale. There will soon be provided a market for them in the country when a large proportion of the amount paid for freight might be saved. At present the expense per ton for shipment to Boston or New York is about fifteen dollars. As this on ores yielding less than forty or fifty per cent. is a large proportion of their value, it is made more essential than ever to send from the mine no ore but what has been brought to the highest per centage possible by cleaning. This is a point on which miners universally are very neglectful, and it is a fact that much ore already received in Boston from the West Indies as well as from Lake Superior, had there to be cleaned before smelting.

All which is very respectfully submitted by

Your obedient servant, &c.

JAMES T. HODGE.

New York, Dec. 18, 1846.